[6-1F] Multiplying Polynomials by Monomials (Distributive Property)

Simplify

① $x(3x-5) = \boxed{3x^2 - 5x}$

② $-3x(2x^2 + 4x + {}^-1) = \boxed{-6x^3 + {}^-12x^2 + 3x}$

③ $5x^3 + {}^-x + {}^-3$
$2x^2$
$$\boxed{10x^5 + {}^-2x^3 + {}^-6x^2}$$

④ $5x^2(2x + {}^-1) + 2x(3x^2 + {}^-4x)$
$10x^3 + {}^-5x^2 + {}^-6x^3 + 8x^2$
$$\boxed{4x^3 + 3x^2}$$

Solve

⑤ $y(2 + {}^-3y) + 3(y^2 + {}^-4) = 0$
$2y + {}^-3y^2 + 3y^2 + {}^-12 = 0$
$2y = 12$
$\boxed{y = 6}$

⑥ $\frac{3}{2}(4x + {}^-6) + {}^-x(3 + {}^-x) = \frac{1}{3}x(3x + 6)$
$6x + {}^-9 + {}^-3x + x^2 = x^2 + 2x$
$3x + {}^-9 = 2x$
$\boxed{x = 9}$

Multiplying Polynomials by Monomials

Objective: To multiply a polynomial by a monomial.

Complete even #'s ONLY!

Example 1 Multiply: $x(x + 4)$

Solution 1 $x(x + 4) = x(x) + x(4)$
$= x^2 + 4x$

Solution 2 $x + 4$
$\underline{\quad x \quad}$ Multiply each term by x.
$x^2 + 4x$

Multiply.

1. $3(x - 2)$ 2. $-2(x + 3)$ $c(c - 4)$ 4. $a(3 - 2a)$

5. $-2b(3 - 4b)$ 6. $-3c(4c + 1)$ 7. $5y(y + 6)$ 8. $-z(4 - 5z)$

Example 2 Multiply: $-2x(3x^2 - 2x + 1)$

Solution 1 Multiply each term of the polynomial $3x^2 - 2x + 1$ by the monomial $-2x$.

$-2x(3x^2 - 2x + 1) = -2x(3x^2) - 2x(-2x) - 2x(1)$
$= -6x^3 + 4x^2 - 2x$

Solution 2 $3x^2 - 2x + 1$
$\underline{\quad -2x \quad}$
$-6x^3 + 4x^2 - 2x$

Multiply.

9. $3x(x^2 - x - 2)$ 10. $-2x(x^2 - 4x + 5)$ 11. $-4x(2x^2 - 3x - 7)$

12. $5x^2(x^2 + x - 3)$ 13. $-6x^2(x^2 - x - 12)$ 14. $4x^3(x^2 - 3x - 6)$

15. $3a^2 - 4a - 6$ 16. $4a^2 - 5a - 7$ 17. $5x^2 - x - 3$ 18. $2k^2 - 3k - 5$
$\underline{\quad 2a \quad}$ $\underline{\quad 5a \quad}$ $\underline{\quad 2x^2 \quad}$ $\underline{\quad -4k^3 \quad}$

Example 3 Multiply: $4x^2y(5x^2 - 3xy + 2y^2)$

Solution Multiply each term of the polynomial by $4x^2y$.

$4x^2y(5x^2 - 3xy + 2y^2) = 4x^2y(5x^2) + 4x^2y(-3xy) + 4x^2y(2y^2)$
$= 20x^4y - 12x^3y^2 + 8x^2y^3$

Multiply.

19. $3x^2y(4x^2 - 5xy - 2y^2)$ 20. $xy^2(x^2 - 4xy - 5y^2)$

21. $-2xy(4x^2 - 3xy + y^2)$ 22. $\frac{1}{3}x^2y(6x^2 - 12xy + 9y^2)$

Multiplying Polynomials by Monomials (continued)

Multiply.

23. $2xy^2(3x^2 - 7xy - 2y^2)$

24. $-4x^3y(x^2 - 3xy - 6y^2)$

25. $5xy(2x^2 - 4xy + y^2)$

26. $\frac{1}{2}x^2y^2(6x^2 - 4xy - 8y^2)$

Example 4   Simplify $3n(n + 2) + n(5 - n)$.

Solution $3n(n + 2) + n(5 - n) = 3n(n) + 3n(2) + n(5) - n(n)$ Use the distributive
$= 3n^2 + 6n + 5n - n^2$ property.
$= 2n^2 + 11n$ Combine similar terms.

Simplify.

show 2 steps

27. $2x(x - 3) + 3x(x + 2)$

28. $4x(3 - 2x) + 5x(x - 1)$

29. $5x^2(2x - 1) - 2x(3x^2 - 4x)$

30. $3y(4y^2 - 3y) - 2y^2(y + 1)$

31. $2n^2(4n - 5) - 3n(2n^2 - 7n)$

32. $2x(5x^2 - 3x) - x^2(x + 6)$

Example 5   Solve $n(2 - 3n) + 3(n^2 - 4) = 0$.

Solution $n(2 - 3n) + 3(n^2 - 4) = 0$ Use the distributive property.
$2n - 3n^2 + 3n^2 - 12 = 0$ Combine similar terms.
$2n - 12 = 0$ To undo the subtraction of 12 from $2n$, add 12 to
$2n = 12$ each side. To undo the multiplication of n by 2,
$n = 6$ divide each side by 2.

The solution set is $\{6\}$.

Solve.

Show work

33. $2(x - 1) + 3 = 7$

34. $3(y - 2) + 1 = 10$

35. $2(2m - 3) - 3(2m - 1) = 9$

36. $4(3a - 1) - 5(1 - a) = 8$

37. $y(3 - 2y) + 2(y^2 - 6) = 0$

38. $0 = 3(1 - 2x) - 5(3 - x)$

39. $x(2 - 3x) + 3(x^2 - 6) = 0$

40. $2x(1 - 3x) + 6(x^2 - 2) = 0$